Investigation of the effect of Glutamine in Lead induced on Hepato-Renal damage in male Rats

Abstract

Background: Lead is the oldest environmental toxin and the most important industrial pollutant. Most of the lead is stored in the liver and kidneys and leads to liver and kidney damage via oxidative stress.

Aim: In this study, the protective effect of glutamine on the toxic effects of lead on liver and kidney tissues in rats was investigated.

Materials and Methods: Thirty-two rats were divided into four groups: untreated control and lead poisoning as well as two similar groups receiving glutamine (0.1% in drinking water for three weeks). To induce lead poisoning, rats in the lead toxicity and lead toxicity groups treated with glutamine received 0.02% lead acetate in oral water for three weeks. Oxidative stress indices (amount of reduced glutathione, advanced protein oxidation products, malondialdehyde, primary and final products of LDL oxidation) and inflammatory (myeloperoxidase and interleukin 1B) were measured. To evaluate liver and kidney damage caused by lead, tissues were stained with hematoxylin and eosin and examined histopathologically. Biochemical hepatic (transaminases, total protein, and albumin) and renal parameters (serum creatinine and 24-hour urinary protein excretion) were also measured.

Results: Lead increased liver and kidney damage by elevating oxidative stress and inflammation. The activity of transaminases and the levels of serum proteins, creatinine, and 24-hour urinary protein excretion were higher in the lead toxicity group than the other groups. Glutamine prevented tissue and biochemical changes in the liver and kidneys following lead poisoning by reducing oxidative stress and inflammation ($p < 0.001$).

Conclusion: Glutamine with antioxidant and anti-inflammatory properties as well as interfering with the accumulation of lead prevented liver and kidney damage caused by lead. The use of glutamine is recommended to prevent the effects of lead in employees exposed to lead.

Key words: Lead poisoning- Glutamine- Oxidative stress – Inflammation- Reduced glutathione